Quarterly REPORT

(for January-March 1997)

Contract No. NAS596060

Enhanced Land cover and Land Cover Change products from MODIS
Algorithm Development and Post Launch Studies

by

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1. At-launch Land Cover Product.

a. Task Objectives:

i) The principal objective of this task is to supply a
validated at-launch land cover product based on the AVHRR at
a resolution of 1 km.

ii) A subsidiary objective is to gain agreement on the
classes to be used in the product.

b. Task Progress:

i) The PI attended the IGBP-DIS Land Cover Validation Working
Group meeting held at UCSB under the chairmanship of Jack
Estes. The meeting developed the plans for the validation of
the IGBP-DIS sponsored 1 km land cover product. The latter
will not be finished until June 97 and validation will not be
completed until November 97 at the earliest. This provides a
possibility that these results can be used in assessing this
product as the at-launch land cover product for MODIS, given
that we are working on the basis that the land cover data
plane could be submitted in December 97 at the latest (a
place-holder has already been submitted), but any unforeseen
slippage of the time-table would mean that other validation
procedures would have to be used.

Preliminary analysis of 2 continents of the 1 km product
using the training data available at UMCP was presented at
the UCSB meeting. It was agreed that the implications of
these could be best achieved by a joint meeting held between
USGS EDC personnel and research staff at UMCP. Subsequently
during this reporting period the former visited UMCP for

three days leading to recommendations about potential improvements to the EDC product.

ii) There was no activity with reference to this sub-task

c. Anticipated Activities During the Next Quarter:

i) No activities anticipated.

ii) No activities anticipated until after the end of the next quarter.

2. Land cover change indicator product.

a) Task objectives

i) Generation of test data sets

ii) Production and testing of the at-launch change detection algorithm.

iii) Production and testing of post-launch change detection algorithm

b) Task progress

i) Effort was mainly directed in the creation of the bit maps of change within the original TM data. This was then transferred to the MODIS data. Effort was focussed on those areas where we had a high degree of confidence that change was occurring.

ii) Several algorithms were implemented including application of a moving window to filter out phenological change, a clustering procedure to isolate only those changes resulting from land cover change, a t1 vs. t2 linear regression procedure, a further refinement of the texture procedure involving several measures of spatial variability.

We also experimented with the representation of changes in terms of the magnitude and orientation of change within the brightness-greenness space. it was clear that the angle (or direction of change) was a much more sensitive indicator of change having occurred than the magnitude.

It was clear also that achieving satisfactory levels of omission error typically led to very high errors of commission. In our further algorithm development work it is clear that achieving a sufficiently low error rate for both types of error will be the main challenge.

iii) Preliminary analyses of the 8km data set in depicting seasonal phenology was carried out as a prototype for using

changes in the previous year's vegetation index as a method of separating seasonal change from actual changes in land cover.

c) Anticipated Activities during the Next Quarter

i) Further refinements to the test data will be carried out to reduce atmospheric effects. Also further images are being sought from the BOREAS project

ii) We will continue to refine the algorithms for change detection

iii) No work is anticipated on this sub-task.

3. Continuous fields of land cover properties.

a) Task objectives

Generation of continuous fields of land cover attributes

b) Task progress

High resolution data were analyzed to provide a data set to calibrate and validate the continuous fields.

Using AVHRR data we created global images of three different types of continuous variables (i) % bare, % herbaceous and % woody, ii) % deciduous and % evergreen, iii) % needle-leaf and % broadleaf. These are attached to the hard-copy of this report. These will form the at-launch land cover product for continuous fields.

c) Anticipated Activities during the Next Quarter

The data planes will be submitted in digital form with all necessary ancillary code and information.

OTHER DEVELOPMENTS

As part of our NSF funded Grand Challenge project on the application of high performance computing for land cover discrimination, we have generated global images of the Walthall BRDF coefficients. The results will be presented at the IGARSS symposium in Singapore.